### Evidence Statement 2008

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Question** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
| One  (a) | See above diagram | 1 Two correct rays or image drawn | 1 Two correct rays and the image drawn |  |
| (b) | Real, inverted, diminished | 1 Correct answer |  |  |
| (c) |  | 2 Correct use of formula, but answer not inverted | 2 Correct working and answer |  |
| (d) | The focal length must be 2.5cm. Light from distant objects is very close to being parallel when it reaches the eye. Parallel rays of light converge at the focal point of the lens, so the focal point must be positioned at the retina for the object to be in focus.  Or: for distant object do= infinity. Using the formula,  then di=f, so the focal point must be at the retina with a distance of 2.5cm | 1 2.5cm | 1 Light from distant objects is parallel therefore the light converges at the focal point of the lens, so the focal length must be 2.5cm.  OR clear explanation using the lens equation. |  |
| (e) |  |  | 2 Correct do  OR  Correct m | 2 Correct working and answer |

Air

Cornea

Direction of wave travel

Wavefronts

Wavefronts

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Question** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
| Two  (a) | Sound waves are longitudinal, light waves are transverse. Sound waves are mechanical / require a medium, light waves can travel in vacuum. Light waves are much faster than sound waves. Sound waves are the oscillation of matter, light waves are electromagnetic waves.Light waves have a much higher frequency 1014 v 107 | 1 Two clear comparisons |  |  |
| (b) |  | 2 Correct answer |  |  |
|  | Hz or s-1 | 1 Correct unit |  |  |
| (c)  (i)  and  (ii) | See above diagram  The right-hand end of the waves speed up before the left-hand end. This causes the waves to travel in a direction away from the normal. | 1 Correct ray direction or correct wavefronts  OR Complete diagram with refraction towards the normal | 1 Complete diagram with wavefronts matching across the boundary. Wavefronts at right angles to the direction of wave travel. | 1 Complete diagram with explanation. |

Three

Air

Cornea

Aqueous Humor

55°

(d)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Question** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
| Three  (a) | 6.45 x 10-16 s | 2 Correct answer |  |  |
| (b) | The dark bands on either side of the central bright band fringe are caused by destructive interference.  Light from one slit travels a distance that is ½ a wavelength longer than the distance travelled by light from the other slit.  Crests meet troughs at these locations causing the light to destructively interfere. | 1 Destructive interference OR crests meet troughs | 1 Links destructive interference due to a crest meeting a trough. | 1 Links this to the distance travelled by the wave from one slit is ½ awavelength longer, compared with the wave from the other slit. |
| (c) |  | 2 Correct substitution into correct equation | 2 Correct answer |  |
| (d) | See above diagram | 1 Correct ray into cornea | 1 Correct diagram |  |
| (e) | Angle of refraction in aqueous humour is 38° | 2 Correct use of equation to get the angle inside the cornea. | 2 Correct angle inside the cornea and attempt to use equation to get the angle into the aqueous humour. | 2 Correct working and answer, either by using the equation twice, or by skipping the cornea step. |

Four

(b)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Question** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
| Four  (a) | Diffraction is the bending of waves around obstacles or the spreading out of waves as they pass through small openings. | 1 Correct description |  |  |
| (b) | See the above diagram | 1 Wavefronts are bent around the barrier. | 1 Achieved plus the wavelength is the same before and after the barrier. |  |